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ABSTRACT

The North Carolina Community College system is composed of 57 technical institutes and community colleges where a variety of curriculums and courses are available. Engineering technology programs have been offered since 1957; at the present time, 180 different occupational curriculums are offered in one or more institutions. In a State system of technical education, local autonomy is a common practice, and the community institution's emphasis is on providing educational programs to meet local needs. There is some degree of State-level leadership provided by the Department of Community Colleges and an effort to be involved in several common administrative concerns. There is a great amount of cooperation among institutions. Enrollment for 1973-74 in the engineering technologies is 4,780, representing about 12 percent of the enrollments in all technical education curriculums. Equipment lists are used to meet State standards. Most of the institutions have common administrative hierarchies, but no two institutions are alike, and no curriculum is exactly alike in any two institutions. Accreditation is a continuing process. Present emphasis is on program improvement and development of new programs. Some work is being done on program articulation with four-year institutions. Inservice education activities are conducted to promote quality programs. (AG)

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A STATE SYSTEM FOR TECHNICAL EDUCATION

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Abstract

North Carolina has a system of community colleges which offers a variety of educational programs to the people of the state. Included in these program offerings are engineering technologies. Information on the overall operation of the system and some of the present activities related to the engineering technology programs is presented.

A STATE SYSTEM FOR TECHNICAL EDUCATION

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The North Carolina Community College System is composed of 57 technical institutes and community colleges located across North Carolina within commuting distance of approximately 95% of the population. These institutions provide a comprehensive offering of full-time curriculums to the people of North Carolina. In addition, numerous part-time programs, short courses and independent study courses are provided on an evening or extension basis. For the year 1972-73 (which are our latest complete figures) there were 84,500 students enrolled in full-time programs and 346,700 enrolled in extension for a total of 431,200 people. This past year 1973-74 total enrollment is estimated to be almost 500,000. To be serving almost 500,000 people in a state with a population of 5 million people, we feel the educational offerings in our institutions have been responded to well.

The thrust of educational offerings in the Community College System is mainly occupational with 54,500 full-time and 171,500 extension students (1972-73). In addition, there are 30,000 in college transfer and general education curriculums and 196,500 in adult and general extension education (1972,73).

Where does engineering technology fit into this picture? Engineering technology programs have been offered in these institutions since 1957 when the industrial education centers were established in North Carolina to provide training for industrial skills. Electronics,

Mechanical Drafting and Design, Chemical and Civil Technology were some of the first curriculums implemented in these institutions during the late 50's and early 60's. As the concept of technical education and the Community College System gained momentum and new industry moved into the state, additional institutions and new curriculums were established. At the present time there are 180 different occupational curriculums offered in one or more institutions. In addition there are about 25 inactive curriculums, some of which will be implemented this fall. These occupational curriculums fit into general classifications such as: Agricultural and Biological Science, Business, Engineering and Science, Health, Trades and Industry, and Special.

Each of these categories includes technology programs offering the Associate in Applied Science Degree.

A number of factors need to be considered in trying to present information on a state system of technical education -- included are facts on curriculums, enrollments, facilities, equipment, faculty, administration and other resources. It is difficult to verbalize the "people" things that happen in reporting on such a broad happening, but that is what has caused any success which can be claimed for our efforts. And much of that happens at the student-instructor interface.

If you talk with individuals in our institutions about their operation, you will hear the words local autonomy being used rather consistently. The institutions have a great degree of flexibility in their operation. What kind of programs they run, who they hire, what kind of facilities they build and where, what equipment they buy, what

textbooks they use, whether they wish to be accredited, and what innovations they wish to implement are all decided by individuals at the local level.

In the community institution the emphasis is on providing educational programs to meet local needs. In addition some institutions offer curriculums that meet a regional or national need. Some examples of programs meeting regional or national needs include Marine Technology, Hotel and Motel Management, Plastics Technology, Dental Lab Technology, Surveying Technology, and Fire and Safety Engineering Technology. There are 50 technology curriculums that are offered in only one institution somewhere in the state. There are 17 technology curriculums offered in more than 10 institutions.

Perhaps it would be of interest for me to mention some of the activities that may be unique to a public state system of technical education. For example, there is some degree of state-level leadership, even with local autonomy, provided by the Department of Community Colleges. Some activities that the Department gets involved in include working with the legislature to provide necessary financial support for the system, administering a budgeting and accountability system to assure an equitable distribution of those funds, providing assistance in the processing of equipment and library books, coordinating curriculum development activities, coordinating an annual conference for instructors, and working with selected instructor groups and associations that meet during the year. The Department maintains administrative memos to cover many subjects that need explanation including suggested salary schedules,

the FTE (full-time equivalent) system, construction funding for institutions, equipment procedures, federal-state relations, library services, statistics, institutional standards, educational programs, student personnel affairs, and the organization and operation of the Community College System. Staff of the Department provide consulting and coordinating services to the institutions for the pruposes of facilities planning, equipment inventorying, equipment transfer, acquiring surplus equipment, operating learning, laboratories and libraries, institutional evaluation, curriculum development, staff development, new industry training, supervision of public service training and management development programs, adult education services, and MDTA.

There is a great amount of cooperation among institutions. There have been a number of regional or statewide consortiums for special projects. One institution for example has established an Engineering Technology transfer program with the surrounding institutions. The local institutions provide the first year of the program, and the student transfers the second year for his specialized courses. Also, institutions, to begin a curriculum, must have the written approval of surrounding institutions. Often an institution beginning a new curriculum will visit other schools in the state offering the curriculum to determine how to most effectively operate the program and what pitfalls to beware of. There are times when an institution has a special short term need for equipment that belongs to another institution. When possible loans are arranged to meet this need. If an institution has phased out a program, the equipment is transferred to another institution. Institutions interested in a new program area usually work together to develop the curriculum guide.

Curriculums that are classified as Engineering Technologies include: Air Conditioning and Refrigeration, Architectural, Chemical, Civil Engineering, Electrical Engineering, Electronics Engineering, Electromechanical, Environmental Engineering, Fire and Safety Engineering, Furniture Drafting and Design, Industrial Engineering, Instrumentation, Mechanical Drafting and Design, Mechanical Engineering, Manufacturing Engineering and Surveying. These 16 curriculums total to more than 100 programs in 34 institutions.

Other curriculums that are related to this category include Enviornmental Science, General Occupational, Hospital Plant Engineering and Maintenance, Industrial Management, Marine, Marine Construction Engineering, Marine Laboratory, Minerals, Occupational Safety and Health, and Traffic Engineering Technology.

Enrollment for 1972-73 in the 16 engineering technology curriculums was 4300, up 5% from 1971-72. For 1973-74 it was 4780. This represents about 12% of the enrollments in all technical education curriculums.

To meet the requirements of the State Purchase and Contract Division, equipment for all laboratories is listed with general specifications and an approximate price. There are over 200 equipment lists developed. These lists provide a listing of equipment necessary to fulfill the objectives of the curriculum. The intent of the lists is not only to give guidance but to give institutions a choice. The equipment lists are developed initially by institutional and industrial personnel with expertise in the field for which the list is being developed. Additional items can be added on request from any institution to fulfill particular local needs. There are about 35 equipment lists to support the various engineering technology curriculums. Most curriculums are supported by from 4 to 8 different equipment lists. For example, equipment lists supporting Mechanical Engineering Technology are: Drafting and Design

Hydraulics and Pneumatics, Machine Tool Lab, Materials Testing, Model and Pattern, Technical Physics, and Vocational Physics.

The faculty for engineering oriented programs come from a variety of sources. Most of them have industrial experience along with a bachelors or masters degree. Some have a PH.D. and some are graduates from technology programs. In some cases instructors have had experience teaching in the military. A number of the instructors are registered professional engineers. Faculty are recruited and hired by the local institution. When the local institution contacts the Department about openings we provide information on those individuals who have submitted applications to us.

Administratively, most institutions have a President, Dean of Instruction, and/or Director of Occupational Education, and Department Chairman. The titles and responsibilities of Department Chairmen vary among institutions. Most institutions with three or more engineering technologies have a chairman for engineering technologies. Some institutions have established instructional departments that integrate vocational, technical, and college transfer into each department under such categories as Physical Sciences, Life Sciences, Business, and General Education.

Diversity is the name of the game in a system of this size. No two institutions are alike and no curriculum is exactly alike in any two institutions. People are different. However, to assure some degree of commonality among the same curriculum in different schools there is an attempt to coordinate curriculum development activities to provide a common base to graduates being recruited by industry. This also provides for transferrability between institutions, and it encourages inter-

institutional cooperation and support in in-service efforts for instructors and in equipment requisitioning. There is no difference between a technical curriculum in a community college and in a technical institute. The major difference between these institutions is the name. The community college offers college transfer curriculums in addition to all the other type programs offered by the technical institute. We try to involve representatives from all interested institutions in the development or revision of curriculums. While we try to develop programs that are commonly agreed upon, at the same time we are encouraging innovations or new approaches to the instructional process. In one emerging field for example we've intentionally let a curriculum go four ways in four institutions in hopes that from the interaction would come a common solution adoptable to the four.

Institutions in North Carolina are involved in the accreditation process. There are presently 38 institutions accredited by the College Delegate Assembly of the Southern Association of Colleges and Schools. The Department has an Institutional Evaluation program to help schools get ready for Southern Association or to become accredited by the State Board of Education. There are 38 institutions accredited by the North Carolina State Board of Education (not all 38 are the same as those accredited by SACS.) Twenty engineering technology programs are accredited by ECPD in five institutions (That's approximately 20% of the engineering technology programs in the State.) Other institutions are in the process of becoming ECPD accredited.

With the base of engineering technology programs established, our activities now at the state level are concentrated on improving the existing programs and in researching and developing new and innovative type programs. We conduct statewide inservice workshops and consult

with institutions planning to start new programs or modify existing programs. Some of the new programs we've been involved in developing include: Occupational Safety and Health, Plastics, Technical Illustration, Marine Electronics, Industrial Management, Surveying (Technical Specialty), Environmental Science, and Marine Construction Engineering Technology. One of our current projects is in the development of curriculums using a career ladder-lattice approach which will provide the student with upward mobility. The purpose of this effort is to provide a curriculum with objectives established for different levels so that at certain points within the curriculum the student has employable skills or if a person can show advanced proficiency he can enter the program at advanced levels. With this concept students leaving a program have employable skills and are not at a loss in the world of work. We have already developed this approach for several areas. For example the Occupational Safety and Health curriculum has been designed so that the student can take short courses on an extension basis, several of which can be equated to courses in the curriculum. Upon completing a series of 8-10 courses the individual can get a certificate. If he is enrolled in the program full time for a year he can graduate with a diploma or if he wishes to complete an additional year of the program he is awarded an Associate in Applied Science degree. We have had favorable discussion with several universities about accepting these students into advanced programs.

As a service agency to the institutions the department becomes involved in development activities in a variety of ways. For example, in developing the Occupational Safety and Health curriculum several institutions indicated their interest in the curriculum. Se we worked on a coordinating basis with these institutions. We contacted key people in the fields of

industrial safety, insurance adjustment, labor, and industrial hygiene, and we talked with university personnel involved in similar programs. We had two statewide advisory committee meetings which brought all of these people together. From this a curriculum manual was developed which provided information for institutions interested in initiating the curriculum.

In the case where only one institution is interested in developing a curriculum we normally work with that institution at their request in a consultant capacity to help identify appropriate approaches and contacts in the development of the particular curriculum. In such a case we normally play a minor role, with the leadership coming from the local institution, since they will be totally responsible for the operation of the curriculum.

We are working with four year institutions which are interested in accepting our graduates into their programs. The Bachelor of Engineering Technology program at the University of North Carolina at Charlotte has been in operation for about four years. It is a thriving program with 3 curriculums presently- Electronics, Mechanical, and Civil - and expanding into a couple of new areas next year. There are several universities that have accepted engineering technology graduates into Bachelor of Technology or Industrial Technology programs with essentially full transfer of credit. Now we have about 5 other colleges or universities interested in this type program for engineering and other technology graduates. There have recently been statewide committees funded by federal funds to develop policies and procedures for transferrability in the field of health occupations. It is felt that this work will provide additional guidelines in facilitating the transferrability of students to other universities in the state.

In an effort to promote quality programs we are involved in inservice education activities. These normally take one of two forms - institutional workshops on instructional methodology or statewide workshops on technical content. In either case these efforts are normally requested and planned by the people for whom the workshop is to be held. In most cases outside consultants or persons with the expertise within the system (not State's staff) are used to conduct the workshops. We just completed our annual Community College Conference involving about 1300 individuals with meetings for 50 different disciplines. This conference is a two and one half day meeting held the last of May at a different community college or technical institute each year. Planning for each of the 50 groups is done by separate committees made up of instructors or administrators from that category. The recommendations of each committee are followed verbatum, where possible, in planning the conference. Outside speakers are used where expertise is not available within the group. Many of these speakers volunteer their time and cover their own expenses for the opportunity to speak to a statewide representation in their field of interest. For example, for the nine engineering and science groups with which I worked this year the total cost of consultants was $75. Altogether, in the engineering and science meetings we had 16 outside speakers and 6 speakers from community college institutions. That this conference is beneficial is supported by the fact that total attendance has grown from 400 to 1300 in the past seven years.

Intensive mid-year workshops are held by a number of groups on specialized technical topics. These workshop efforts are handled similarly to that of the Conference. In some cases these meetings are organized so well by the individuals concerned that all we have to do is to announce the meeting and attend. In addition to workshops on topics such as

metallurgy, materials testing, integrated circuits, hydraulics and pneumatics, true position dimensioning and non-destructive testing, instructors have had sessions on curriculum, equipment, teaching techniques, textbooks, and accreditation.

We try to respond to the needs of the institutions as they make these needs known to us. Therefore our activities within the department are constantly changing. Our responsibilities also are continually evolving. In response to staff development needs of the institutions, a unit has been recently formed to provide this kind of service to the institutions. At the same time, in response to the numerous programs being developed utilizing the career ladder concept, we have organized our program responsibilities to help facilitate this development. We have identified eleven categories of programs that seem to logically group together by content. They are Agricultural and Natural Resources, Art and Design, Business, Construction, Educational, Electrical-Electronics, Health, Mechanical-Manufacturing, Transportation, Service, and Public Service.

This will tend to avoid overlap of program responsibilities as we continue to develop curriculums using the career ladder approach. Other areas we are encouraging include cooperative education, technical specialties, part-time evening curriculums, articulation among institutions, and individualized instruction approaches.

The institutions in the Community College System of North Carolina are using these concepts and others to respond effectively to the educational needs of the State.

Thank you.

Any Questions?